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**Karen Moore & Trish Holyoake
GPO Box 4440
Melbourne Vic 3001**

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Summary

Innovation is a major contributor to improving farm productivity and sustainability and yet non-adoption continues to be a common concern for all agricultural industries. The aim of this project was to identify the drivers and barriers to the adoption of innovation or new technologies developed under the auspices of APL on pig farms.

This study used questionnaires to measure pig farmers' and veterinarians' knowledge and adoption of three technologies (Prohand, APPAlive® and pond covers) and to determine how they received information about innovations. Three focus groups were conducted with pig farmers to explore in more depth knowledge and opinions of the research being conducted under the auspices of APL for the pig industry.

Of the 458 surveys sent to pig farmers, 100 (22%) completed surveys were returned for analysis. Awareness of the three technologies ranged from 25% of producers surveyed (APPAlive®) to 62% (pond covers), with 32% of respondents being aware of Prohand. Industry publications, APL publications, industry seminars and workshops, veterinarians and other farmers were the major sources of information for producers surveyed. Producers with smaller herds were less likely to have heard of the technologies than producers with larger herd sizes.

One hundred and forty-four surveys were emailed to veterinarians of which eight (5.5%) were returned. The major provider of veterinary advice to pig producers was not represented in this cohort, hence results of this section should be interpreted with caution. Face-to-face communication during farm visits or producer group seminars was the preferred method of communication for veterinarians, with demonstration of productivity/profitability improvements the major tool used to convince clients to adopt technologies.

Thirty-four pig producers participated in the three focus groups. Participants informed that published materials were preferred over electronic communications due to email "over-load" and/or restricted email access by many workers. There was a lack of awareness of APL membership and its role in technology communications. Face to face communication was identified as a preferred medium for improving technology transfer and adoption by producers and had the added advantage of providing a platform for producers to network. Producers identified high staff turnover and limited opportunities for new piggery workers to access information and training as an important challenge facing industry sustainability.

The results of this study identified a number of factors limiting innovation awareness and adoption by pig producers in Victoria. Key among these was the low level of knowledge in this group of producers, of the research that APL supports. This would indicate a breakdown in the technology transfer process. An examination of current communication methodologies may need to be undertaken to ensure there is not an over-reliance on written and electronic communication. Increasing the number of face-to-face extension activities via road shows etc should be explored, certainly for innovations where there is more uncertainty, higher cost and potentially higher risk for

the adopters. Another constraint to the adoption of new technologies was that some producers lacked confidence in the results. They felt that the trials were done on sub-optimal farms, not typical of the industry which led to overstated results, which they believed would not be achievable on their farm. Increased face-to-face communication would allow interaction between investigators and the target audience to provide a more thorough discussion of research outcomes. The study identified that producers with small herd sizes had very little contact with or knowledge of APL. These producers could pose a significant biosecurity threat to the industry and efforts should be made to ensure they receive information. One method may be to facilitate or assist these small producers through the formation of local networks or producer groups.

Our results suggest that the translation of research into practice is dependent on multiple factors which include receiving information of new technologies, identifying benefits and being able to clearly understand how to apply the new technology. If valuable technologies are to be adopted it is vital that consideration of their on-farm implementation be done in the early stages of the research to ensure they will tick the boxes for producers and veterinarians. The innovation must be shown to confer a relative advantage over existing technologies at a reasonable cost, be easy to understand and implement and have low levels of risk. The inclusion of a field based extension and evaluation plan in all research proposals would likely facilitate the adoption of many new technologies.

Introduction

There are multiple examples where research outcomes have been adopted by the pig farming sector resulting in sustained, positive gains. Conversely, resources and efforts have been spent developing technologies that have not been widely adopted by industry. The broad aim of this project was to identify the drivers and barriers for adoption of new technologies by the pig farming sector

Methodology

Producer Survey

The survey consisted of an anonymous self-administered questionnaire posted to 458 producers. The survey population was all pig producers in Victoria with an active registration on the APL PigPass database. The questionnaire was to be completed by the owner or manager of the farm. It consisted of 20 (mostly closed) questions covering, basic farm information, three technologies (Prohand®, APPAlive® and effluent pond covers), and two questions asking how producers received information about new technologies and what their preference was for receiving this. The three technologies were chosen based on their age, with Prohand® being considered a relatively “old” technology, APPAlive® as a “medium” term and pond covers a relatively new technology.

The survey was resent four weeks later to those who had not returned it.

Veterinarian Survey

The survey was emailed to 134 members and 10 veterinary associates of the Australian Pig Veterinarians on the 5th of November. A second email was sent out on the 13 of December.

Focus Groups

Four focus groups were scheduled in Bendigo, Tatura, Ellinbank and Ballarat. A total of 34 pig producers participated in three focus groups with the Ellinbank focus group being cancelled due to a lack of interest. The first focus group had 14 participants. It consisted predominantly of farm workers and managers but also included one owner. The second focus group had 10 participants. It consisted of farm workers and middle-level managers. The third focus group also had 10 participants most of whom were piggery owners.

The objective of the focus groups was to explore in detail farmers' perceptions of APL's research and extension activities. Three topics were used to initiate discussion but the groups were allowed to move to other topics. These were:

1. Is APL supporting research that meets your needs?
 - a. How do you know what research APL is funding?
2. What is your opinion of how APL communicates with you to identify your research needs and expectations?
3. What is your opinion of how APL monitors technological adoption – for instance how they assess the success of new technologies in the field (under real circumstances)?

Participation was voluntary and written consent was obtained from participants.

Results

Producer Survey

Of the 458 surveys sent, 97 (21%) were returned in the first round. One survey had insufficient data for analysis giving a total of 96 surveys from the first round. A reminder survey was sent resulting in an extra four surveys being returned. Three letters were also returned undelivered. In total there were 100 (22%) out of a possible 455 surveys for analysis.

Summary Statistics

Tables 1 and 2 give a breakdown of the farm types represented by the respondents. Most of the producers surveyed kept sows (88%). Eight producers were grow-out only and 4 producers did not indicate. The 100 farms represented a total sow number equivalent to 27,540 sows. (Pig numbers from grow-out only farms were divided by 10 to give an equivalent sow number). Thirty-eight respondents (38%) indicated that they had outdoor herds, 25 respondents had indoor only and the remainder consisted of a mix of housing types.

Table 1: Herd size categories of respondent's farms

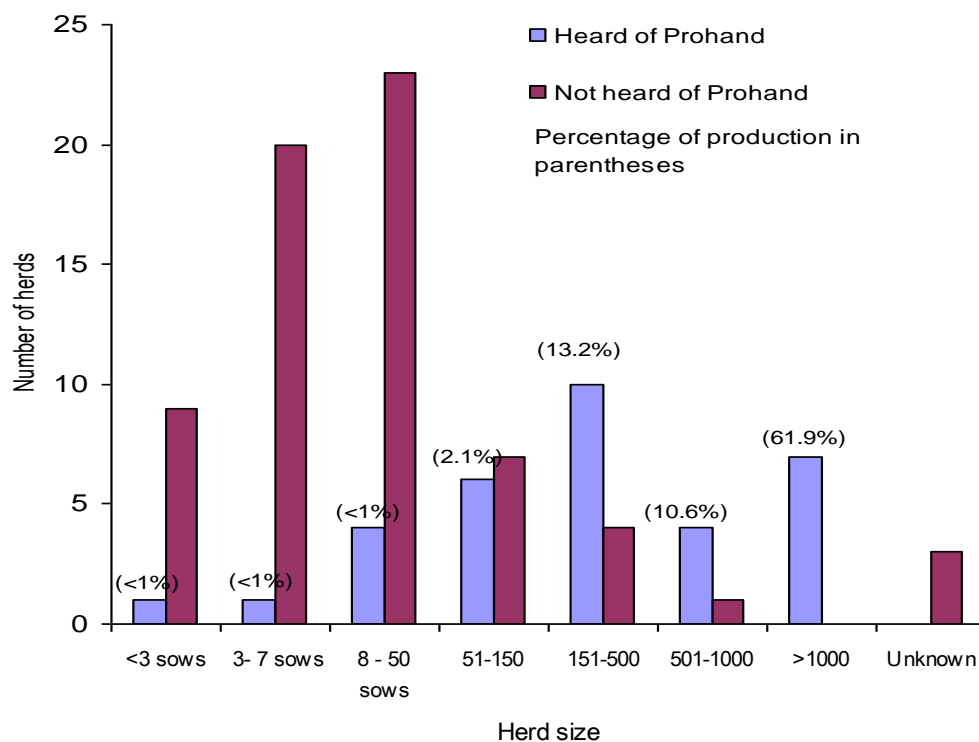
<i>Herd size</i>	<i>Number</i>	<i>Percentage</i>	<i>Percent of production</i>
Own use (<3 sows)	9	9.0	<1.0
Pig Keeper (<8 sows)	21	21.0	< 1.0
Small Holder (8-50 sows)	27	27.0	2
Small commercial (51-150)	13	13.0	5
Medium Commercial (151-500)	14	14.0	19
Large commercial (501-1000)	5	5.0	12
Large commercial (>1000)	7	7.0	62
Unknown	4	4.0	

Table 2: Pig housing type

Housing	Number	Percentage	Percent of production
Indoors (no bedding)	25	25.0	57.6
Indoors (bedding & no bedding)	10	10.0	14.0
Indoor (bedding and no bedding) and outdoor	1	1.0	<1.0
Indoor (no bedding) & outdoor	5	5.0	2.0
Indoors on bedding	8	8.0	1.7
Indoors (on bedding) and outdoor	11	11.0	10.6
Outdoor	38	38.0	13.4
Unknown	2		

Case Study 1 ProHand®

Thirty-two (32.0%) of the producers surveyed had heard of Prohand®. These 32 producers equate to 88% of the production for those surveyed. The distribution of those who had heard of Prohand® by the size of their herd and the percentage of production is shown below (Fig 1).

**Figure 1: Number of producers who had heard of Prohand® by herd size**

Logistic regression was used to investigate the relationship between having heard of Prohand® and herd size. Larger herds were more likely to have heard of Prohand® (OR 3.7; 95%CI 2.2-6.2). Larger herds were also more likely to have used Prohand® (OR 2.7; 95%CI 1.7-4.4).

Most producers who had heard of Prohand® became aware of it through APL communications (41%), industry seminars or workshops (43.8%) and industry journals (34.9%). Other methods included from consultants and other pig farmers (both 28.1%). (Note: producers could select more than one method of communication hence percentages do not add to 100).

Seventeen producers or 53% of those who had heard of it had actually participated in Prohand®. These seventeen producers represent 57% of the production of those surveyed. None of the smaller producers (those with less than eight sows) had participated in a Prohand® course.

The most important reasons for participating or not participating in Prohand® are shown in Tables 3 & 4 below.

Table 3: Reasons for participating in Prohand® (n=17)

<i>Reason for participating</i>	<i>Number</i>	<i>Percentage of responses*</i>
Benefit me or my staff	15	88.2
It was compulsory	8	47.1
Received financial incentive	0	0.0
Marketing advantage	1	5.8
Had a welfare incident on farm	0	0.0
Others doing it	1	5.8
Other reasons: Benefit my animals Part of training and welfare Make shed easier to work in To provide specific training for pig handling	4	23.5

* Percentages do not sum to 100 as more than one option could be selected

Table 4: Reason for not participating among those who had heard of Prohand® but not participated (n=15)

<i>Reason for not participating</i>	<i>Number</i>	<i>Percentage of responses*</i>
No benefit	6	40.0
Cost too much	4	26.7
Not enough time	8	53.3
Could not access training	3	20.0
Advised not to do it	0	0.0
Other reasons: No staff (I know my pigs) Have own training package Getting out of pigs	4	26.7

* Percentages do not sum to 100 as more than one option could be selected

Case Study 2 APP Alive®

Twenty-five producers (25.0%) had heard of APP Alive®. These 25 farms equate to 69% of the production for those surveyed. The distribution of those who had heard of APP Alive® by the size of their herd and the percentage of production is shown below (Figure 2).

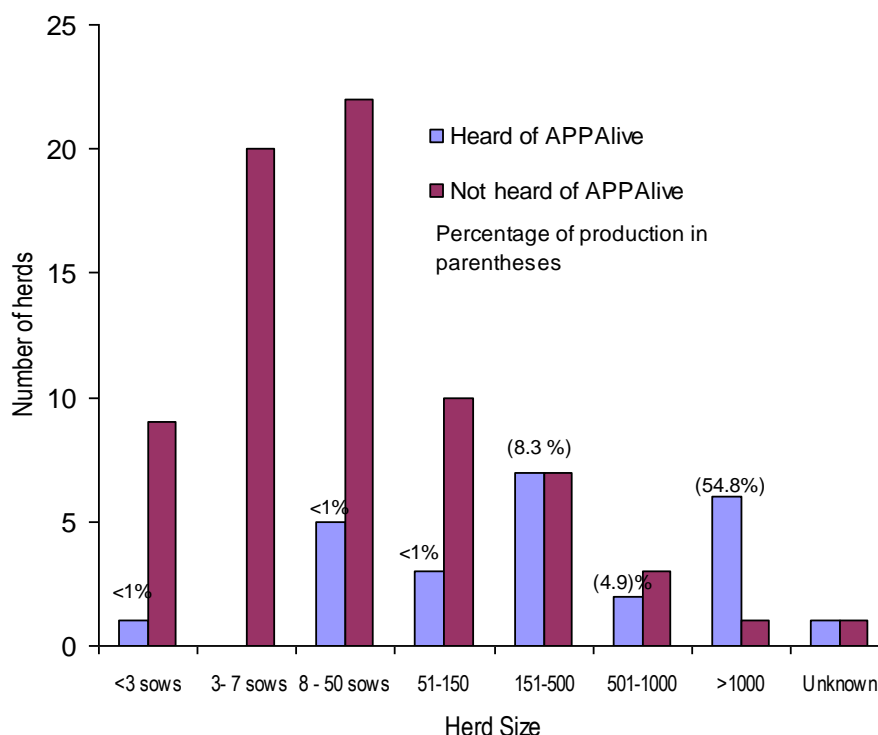


Figure 2: Number of producers who had heard of APP Alive® by herd size

Producers found out about APP Alive® mostly from APL (44%), private consultants (eg veterinarians) (44%), industry journals (40%) and from talking to other pig producers (36%). Other means were from State government staff (24%) and from attending seminars and workshops (16%).

Only one of the twenty-five producers (equating to 14.5% of production) had used APP Alive® which was on veterinary advice.

Table 5: Reasons for not using among those who had heard of APPAlive® (n=24)

<i>Reason for not using APP Alive</i>	<i>Number</i>	<i>Percentage*</i>
Veterinary advice	5	20.8
I do not have APP in herd	16	63.6
Current APP strategies working	5	20.8
Too expensive	0	0
Too hard	1	4.2
Didn't want to perpetuate bacteria in herd	1	4.2

* Percentages do not sum to 100 as more than one option could be selected

Case Study 3 Pond Covers to Capture/Burn off Methane

Sixty-two producers (62%) had heard of pond covers. These 62 farms equate to 89% of the production for those surveyed.

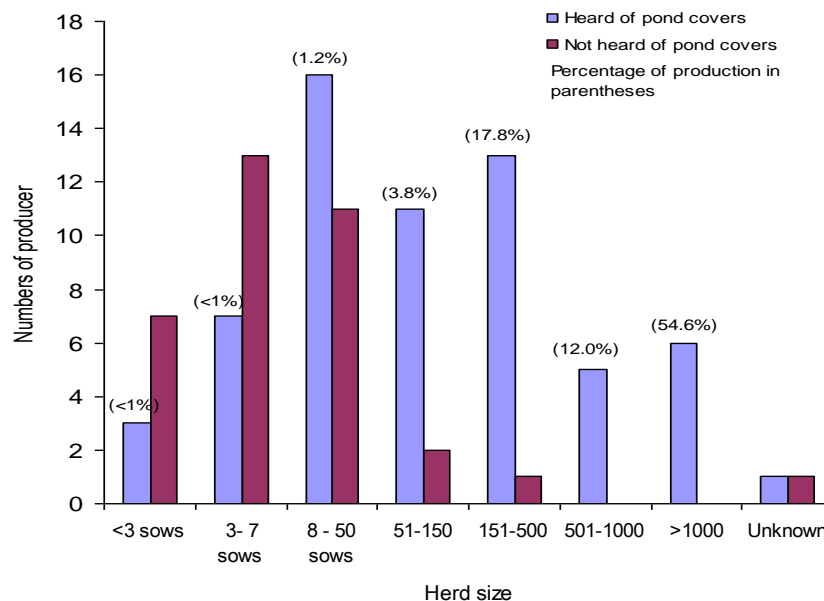


Figure 3: Number of producers who had heard of pond covers by herd size

Table 6: Methods for becoming aware of pond covers (n=62)

Means of becoming aware of pond covers	Number	Percentage*
Any communication from APL	29	46.7
Communication from State Government officers	2	3.2
Other pig farmers	13	21.0
Industry journals	39	62.9
Private consultants or veterinarians	3	4.8
Industry seminar	15	24.9
Any communication from Pork CRC	11	17.7
Other (eg own research, other industries, other media sources)	8	12.9

* Percentages do not sum to 100 as more than one option could be selected

Of those who had heard of pond covers 9 (14.5%) were either using them or planning to use them (equating to 37% of production). One person who had not previously heard of them indicated that they use them. Forty-seven (75.8%) were not using them and 6 producers were unsure if they would or wouldn't use them.

Table 7: Reasons for using or planning to use pond covers (n=10)

Reason	Number	Percentage*
Environmental concerns	7	70.0
Generate income through carbon trading	8	80.0
Reduce energy costs	9	90.0
Experimental field data to support use	2	20.0
Promoted by APL/Pork CRC	2	20.0
Able to get financial assistance	0	
Other farmers doing it	1	10.0
Other reasons	3	30.0

* Percentages do not sum to 100 as more than one option could be selected

Table 8: Reasons given for not using pond covers among those who had heard of them (n=62)

Reason	Number	Percentage*
Wouldn't benefit me	13	20.9
Costs too much	11	17.7
I/my staff have not had time	2	3.2
Could not access advice	3	4.8
I was advised against it	13	21.0
Other (Free range, no ponds, not enough effluent and have digester)	28	45.5

* Percentages do not sum to 100 as more than one option could be selected

How Producers Receive Information about New Technology

Producers were asked to rank, (on a scale of 1-5, with 1 being most frequent and 5 being least frequent), how they usually found out about new technologies. "Written material" was ranked the most frequent by 38% of producers, followed by "other pig farmers" (30%) and APL (23%). Almost a fifth of producers ranked the internet and their veterinarian as sources of information on new technologies (Figure 4).

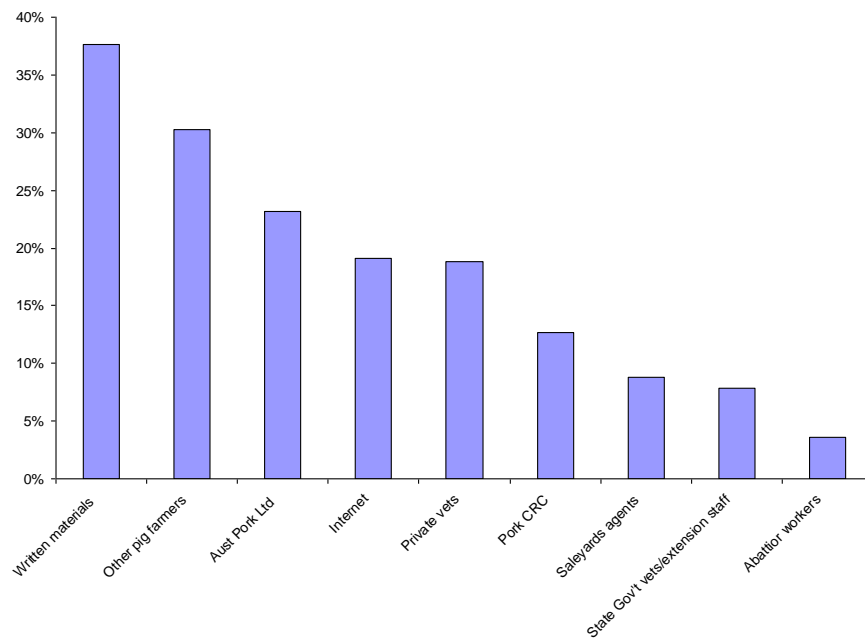


Figure 4: Most frequent methods of receiving information about new technology

Most producers with smaller farms (50 or less sows) got their information from written material. The next most frequent method was from other pig farmers. The most frequent way of hearing about new technologies for producers with large farms was from other pig farmers followed by written materials. Private veterinarians were the third most frequent way for larger producers. Producers were also asked to indicate what their preferred method for receiving information of new technology was. Most producers (60%) selected written material as their number one way of receiving information. Receiving information electronically was the preferred method selected by 36% of producers (Figure 5). Most producers preferred to get their information either via written materials or electronically. Only around one in four producers (both small and large) selected private veterinarians as their preferred method of receiving information.

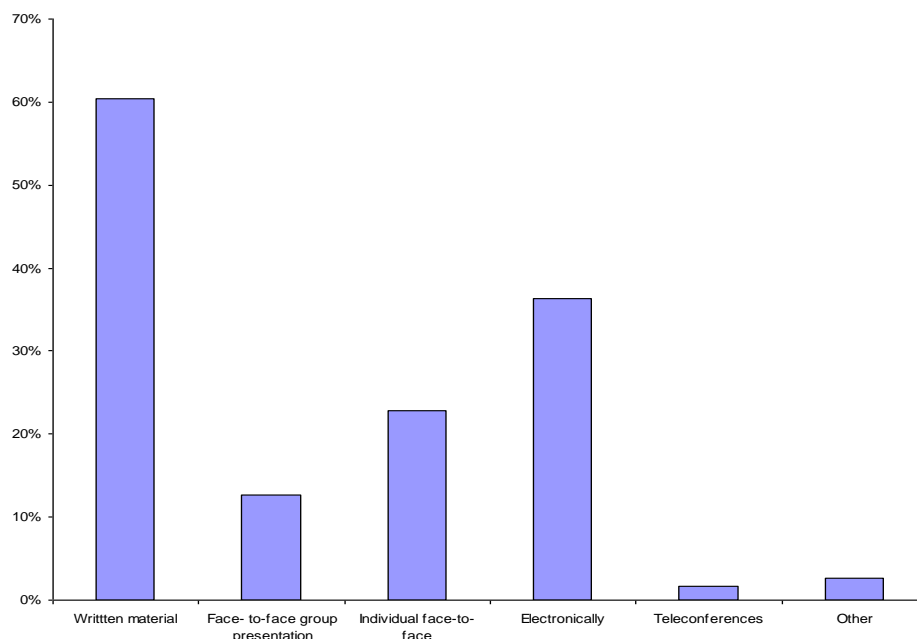


Figure 5: Percentage of producers who selected each method as their number one preference.

Veterinarian Survey

There were five responses from the first email request. The second email request resulted in three more surveys being returned to give a very poor response rate of 8 out of 144 sent (5.5%). Of the eight veterinarians who responded, one was no longer practicing. Given that the majority of the pig industry is serviced by approximately 25 veterinarians, it is likely that this response rate reflects the views of approximately 30% of practicing pig veterinarians. It was unfortunate that there were no responses from the largest independent provider of veterinary services to the pig industry and no inferences can be made about this group. The veterinarians were asked to indicate how many farmers they talked to in an average per week. Responses ranged from 0 to 45 farmers, with the average number being 11 (Figure 6).

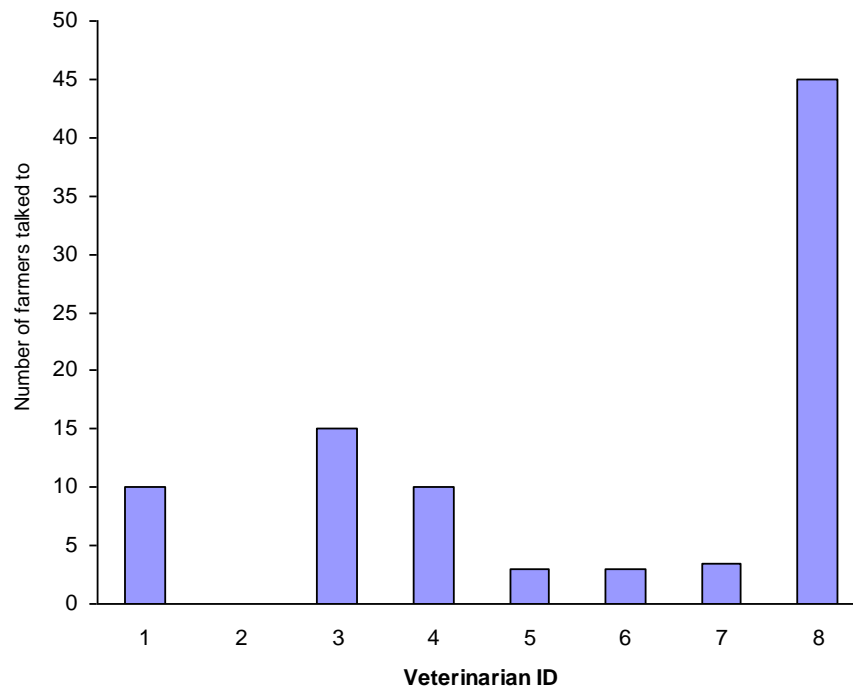


Figure 6: Average number of farmers talked to by each veterinarian per week

They were also asked how many farms they visited weekly. This ranged from 0 to up to 10 farms visited weekly. Most of the veterinarians visited between 1 – 2 farms per week.

The veterinarians were asked if they had heard of the three technologies, Prohand®, APPAlive® and Pond covers, and if so whether they would recommend any of these technologies to their clients.

ProHand®

All of the veterinarians had heard of Prohand®. Five (62.5%) indicated they would recommend it to their clients. Three veterinarians responded that they would not recommend it to their clients. Two of these said they wouldn't recommend it because it takes too long and is "resource and staff-hungry". One suggested it should be on the internet. The third respondent said their recommendation depended on who the 'Prohand person' was who was delivering the course.

Table 9: Proportion of clients who have used Prohand as reported by veterinarians

<i>Proportion of clients who have participated in Prohand®</i>	<i>Number of veterinarians reporting proportion</i>
None	1
1-24%	1
25-49%	-
50-74%	3
75-100%	1
Don't know	2

Four of the eight veterinarians reported that 50% or more of their clients had participated in Prohand®.

APPALive®

All the veterinarians had heard of APPALive®. Most indicated that they would not promote its use. The one veterinarian who indicated they would recommend it specified that it would be as a last resort if the injectable vaccine failed.

Table 10: Veterinarian responses to the question “Would you promote APPALive® to your clients?”

<i>Would you promote the use of APPALive®?</i>	<i>Number of veterinarians</i>
Maybe	1
No	4
No (all my herds are free of App)	1
Yes	1
Don't know	1

Three veterinarians reported that between 1-24% of their clients had used APPALive®. The remainder either indicated that none of their clients used it or that they didn't know if their clients had used it (Table 11).

Table 11: Proportion of clients who have used APPAlive® as reported by veterinarians

<i>Proportion of clients who have Used APPAlive®</i>	<i>Number of veterinarians reporting proportion</i>
None	3
1-24%	3
25-49%	-
50-74%	-
75-100%	-
Don't know	2

Pond Covers

As with the other technologies all the respondents had heard of using pond covers to capture methane gas, with five of them indicating that they would promote their use to their clients. Two didn't know if they would or would not and one said they would not recommend pond covers because aerobic digesters were better.

Table 12: Proportion of clients who would install pond covers as reported by veterinarians

<i>Proportion of clients who would install pond covers.</i>	<i>Number of veterinarians reporting proportion</i>
None	2
1-24%	4
25-49%	1
50-74%	-
75-100%	-
Don't know	1

Most veterinarians reported that they thought that between 1-24% of their clients would install pond covers.

Methods Used to Inform Pig Producers of New Technologies and Encouraging Their Adoption

Veterinarians were asked to rank, (on a scale of 1-5, with 1 being most frequent and 5 being least frequent), their preferred methods for providing clients with information about new technologies. The method ranked as number 1 by most veterinarians (75%) was individual face to face meetings such as during farm visits. The second most popular method (five of the eight vets ranked it as their number 2 preference) was face to face group presentations such as seminars.

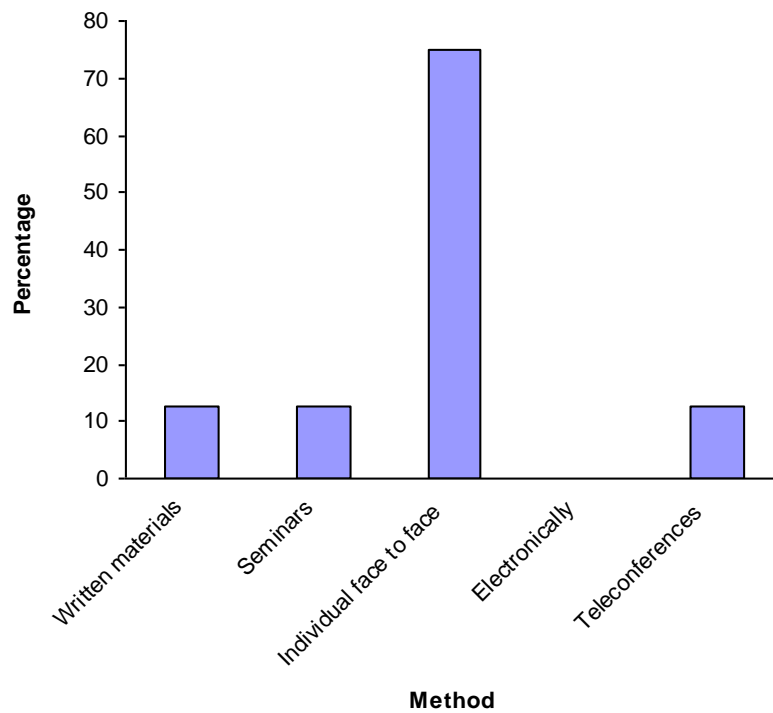


Figure 7: Percentage of veterinarians who rank the particular method of providing information to clients as their preferred

Veterinarians were also asked to rank, (on a scale of 1-5, with 1 most preferred and 5 being least), their preferred methods for encouraging clients to adopt new technologies. The method ranked as number 1 by most veterinarians (37.5%) was to show them the cost benefits (Figure 8).

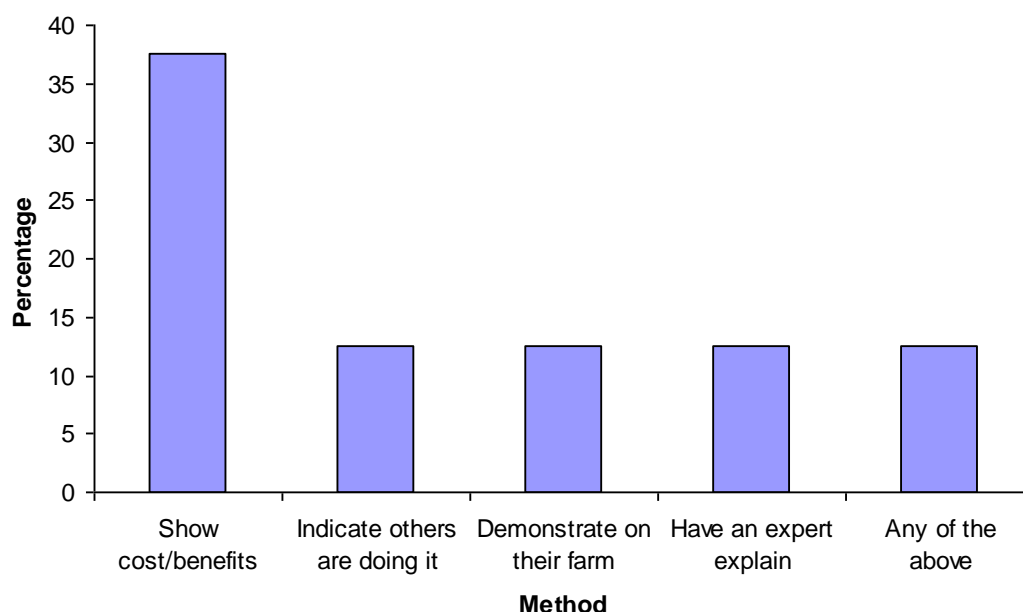


Figure 8: Percentage of veterinarians who rank the particular method to encourage adoption as their preferred

Focus Group Results

Focus Group 1

Generally respondents didn't appear to know what research projects were supported by APL and could not comment on its relevance to their piggery. This was partly because many of them were farm workers and not in managerial positions. They felt that they were often kept in the dark. On one of the larger farms the workers said that research was largely conducted in house and that they were kept informed of outcomes via emails or face-to-face by their managers.

The group commented that one of the best ways for getting information about new technologies was to be a member of a producer group. A couple of producers were APL producer members and they commented that they received weekly emails from APL. While it was good for getting information, a number of participants said that sometimes there was an overload of information. A number of participants were VFF Pig Group members and claimed that this was a valuable source of information. There was discussion on the costs of being a VFF member and although this was not defined in the group, it was seen as a potential obstacle for joining. One participant believed that 90% of small pig producers would have no contact with APL or the VFF pig group and would have no idea how to access these groups or where to get information about pig production from. He felt that there should be more focus on these smaller producers because they had the potential to develop into larger enterprises.

Of concern to most of the participants was that APL no longer published a hardcopy version of their newsletter. Participants commented that the hardcopy used to be available for reading by piggery workers during tea and lunch breaks and was widely read. Most workers no longer saw it as they either did not have access to a computer or if they did they were not prepared to allocate time sitting at the computer.

Participants identified the APL delegate in their state as the person they would contact if they felt that research was required in certain area. The research the group was interested in was mainly around health (more cost effective vaccines) and improving feed, welfare and housing.

There was little comment from the group regarding how APL monitors new technologies in the field. One comment was that 'on-going' information sessions were needed because there were always 'new-players' coming into the industry.

Focus Group 2

The group discussions indicated that participants had no substantial knowledge of the research that APL funded. When asked about the research APL funded, no one in the room could name a project that had been done. It was commented that few workers would have heard of APL. The middle managers present said they had contact with APL through emails they received. As with the previous group they felt there was email overload and they rarely had time to read them. One of those present said they always printed a copy of the APL newsletter which was left in the staff tea room for those who wanted to read it. Those who were not managers said that they had no contact with APL representatives.

It was suggested that information stops at management level. Those present found out about new innovations through their managers. Another participant noted that the contractors he worked with often heard about things from other farmers. Unfortunately a lot of this advice was actually incorrect and required intervention to prevent problems occurring. The group identified that with the trend for increasing herd size, coupled with biosecurity and welfare concerns, there was perhaps more reluctance for producers to attend face-to-face meetings with representatives from other farms. This may create a "silo" effect where fewer producers have the opportunity for networking and information exchange. In conflict to this, participants did identify face-to-face meetings as a good means of technology transfer and felt this was an area with gaps in the current climate.

It was suggested that APL should consider those who do the work in piggeries, those at the 'coal-face'. Some participants felt that to improve the industry and make it more sustainable effort should be put into educating and motivating piggery workers. There was a lack of succession planning with not enough enthusiastic staff coming up the ranks to take over as current members prepare to retire. Participants felt there should be more investment in people and facilities with more training and seminars to be targeted at the workers.

Focus Group 3

This group appeared to have little knowledge of the research that APL funds. There was confusion between APL and the Pork CRC with some participants believing that all research was undertaken by the CRC. Participants felt that the research only targeted the big companies, who pushed the agenda, and that there is little research of relevance to smaller enterprises. There was a perception among the group that research:

- is either conducted on farms that have huge problems so that the results look good or that it is done on unrepresentative farms
- is no good but made to look positive so that the researchers can get funded
- is just re-inventing the wheel.
- is being undertaken by researchers who don't really know anything about the day to day activities of a piggery

Farmers who already had reasonably good productivity doubted that the research would benefit them.

Participants stated that they received information from APL via email (Eyes and Ears, Pork it up) but they were confused as to the source and validity of the data. There was concern that APL do not provide the printed books that used to be available. The participants stated that they had difficulty finding things on the APL website.

A number of the producers were not aware that registering for a PigPass NVD did not automatically make them an APL member and were confused as to why some people (likely APL members) were receiving information and they were not. Others did not know that they could get information from APL if they were APL members. They also did not know how to become APL members or VFF pig group members.

The group was asked how research should be disseminated to pig producers and what would help them adopt new technologies. The group did not think that publishing a report or journal article was the best way to disseminate the information. They believed the best way was through extension activities. They wanted more seminars, workshops, evening seminars and roadshows. These were the best way to engage and inform farmers. The group identified with two workshops/seminars held in 2012 organized by staff at the Victorian DPI ("Survivability – the key to success" and "Flemming Thorup"). They also pointed out that these activities were good for the many newcomers to the industry. Farmer networks were identified as a good method of information dissemination. It was suggested that because the industry tended to be dichotomous (large versus small farms), that messages needed to be targeted differently, using appropriate language, to each group.

A lack of succession planning as a problem for the industry was raised by the group. One participant was concerned that APL were not interested in the mental health and wellbeing of pig farmers. The participant said that pig farmers feel marginalised and made to feel cruel to their animals due to the consumer perceptions about the industry. It was suggested there needed to be more investment into the psychological pressures put on farmers in the pig industry and how this impacted on mental health and sustainability in the industry.

Summary

The focus group meeting results highlighted three major factors that would impinge on technology adoption.

Factor 1: Lack of Awareness of APL-Directed Research.

Participants wanted fewer emails and more printed materials that they could read in their breaks at the piggery. For large farms, manager-directed emails often did not filter down to the workers.

Participants were confused about APL membership and the benefits of membership relating to information updates. Membership to producer groups was identified as a useful tool for information dissemination. Smallholders are not being reached by APL.

Producers wanted more face-to-face communication and identified that basic stockperson competency was a skills gap associated with high industry turnover.

Factor 2: Research Relevance

Participants indicated that the research directed by APL was often irrelevant to their situation and was primarily targeted at farms with large herd sizes. In some cases they felt the research was “re-inventing the wheel”. There were concerns that the research outcomes were often over-sold to justify the investment.

Factor 3: Technology Adoption

Producers stated they were more likely to adopt a technology if they heard or saw that it worked on another pig farm that they were familiar with. With increasing herd size and less opportunity for networking/producer group discussions, the opportunity for producers to disseminate information in this way is lost.

Suggestions for Improvement

1. Reduce email traffic and, where possible, replace this with written publications. Complement this with increased face-to-face communication.
2. Increase smallholder engagement through identifying communication methods (e.g. Genetic suppliers to smallholders, related networks and organizations such as Pig Breeders Association) and promoting the methods and benefits of APL membership. Have different messages for large producers and smallholders.
3. Develop platforms to support basic stockperson competency.

General Discussion

We used surveys and focus group discussions to gather quantitative and qualitative data on aspects of technology transfer and adoption by pig producers in Victoria. The results of the postal survey suggested that producers were willing to adopt those technologies that they perceived would benefit them, that were not too costly and that they could allocate enough time to. This is in line with Roger’s theory of diffusion which states that technologies will be adopted depending on five attributes; their relative advantage, ability to be trialed, complexity, observability and compatibility with existing technologies (Guerin and Guerin 1994). Not surprisingly, the technology with the greatest recognition (pond covers), was the most recent technology. It is likely that the low recognition rate for APPAlive® (a relatively recent technology) was linked to herd health status, with adopters being those producers with APP-infected herds with uncontrolled disease.

Importantly the questionnaire results showed that many pig producers with smaller herd sizes had not heard of any of the three technologies indicating that this sector of the industry is isolated compared to producers with larger herd sizes. This observation was confirmed during focus group discussions where smallholders were identified as having little or no contact with either APL or the VFF pig group and did not know how to gain membership. Focus group participants identified being a member of a group (such as APL or the VFF pig group) as one of the best ways of getting information about the pig industry. Although the three technologies tested in the questionnaire had no regulatory framework, it is likely that farmers with smaller herds may also be less aware of other information that may be of high risk to the industry as a whole (e.g. biosecurity and welfare). Communicating with smallholder producers within the pig industry is challenging but is critical to minimise industry risk. Efforts should be made to identify possible conduits for industry information, for instance smallholder representatives such as suppliers of breeding stock.

All the eight veterinarians who responded had heard of the three technologies but not all of them would promote their use. Most of the veterinarians would promote the use of Prohand® and Pond covers. Reasons for not promoting Prohand® were that it was too resource hungry or dependent on the quality of the provider. Only one of the eight veterinarians would promote the use of APPAlive®. The survey was unable to capture the reasons why there was little interest from veterinarians in promoting APPAlive®. The results suggest however, that for some new technologies, veterinarians are prepared to promote them as long as they can see that they are valuable to their clients.

Responses from the producer questionnaire indicated that they received information on the three technologies tested from a number of sources including APL, electronic communications, industry publications, face-to-face seminars and consultants. In contrast, producers participating in the focus group discussions claimed to be totally unaware of any research auspiced by APL. In addition, in contrast to the postal survey results, focus group participants did not support electronic communication due to email overload and limited time/computer access and indicated a preference for face-to-face communication. The difference between the results from the questionnaire and the focus group discussions is possibly due to selection bias. Only around 25% of questionnaires were returned, possibly from those who preferred electronic or written communications. Similarly only a small percentage of farmers attended the focus groups and these were more likely to be farmers who preferred face to face contact. An alternate explanation for the conflicting questionnaire/focus group results is that owner/operators were mostly responding to the postal questionnaire, whereas many focus group meetings were attended by piggery workers and middle-level management.

A common means of accessing information on new innovations identified in both the questionnaire results and during focus group discussions was from other farmers or through pig producer groups. An important barrier to technology adoption identified during focus group discussions was the perception that research had been undertaken on “atypical” pig farms and that results were overstated to justify research investment. Workshops and seminars have a two-pronged benefit in that they provide a platform for face-to-face discussions on research outcomes and the opportunity for peer review as well as a method for producer networking and exchange of ideas. The focus group discussions identified a need for more face-to-face workshops and training.

Because producers receive information from many sources it is vital that a variety of extension methodologies continue to be available. Certainly industry journals and communications from APL will continue to be important sources of information, however the results of this study would indicate that face to face extension activities such as roadshows and expert-led seminars have the potential to deliver better adoption outcomes. Veterinarians may provide an interface between new technologies and producers, however only around a quarter of producers were keen to receive this information from veterinarians. Producers wanted advice that they considered independent. As veterinarians were only willing to promote technologies if they could see a clear benefit for their clients, effort would need to go into ensuring that they were fully informed of the costs and benefits of any innovation by the relevant research bodies.

Conclusion

This study has identified a number of factors that may reduce adoption of innovations in the pig industry. Key among these was the low level of knowledge in this group of producers of the research that APL supports. This would indicate a breakdown in the technology transfer process. An examination of current communication methodologies may need to be undertaken to ensure there is not an over-reliance on electronic communication. Increasing the number of face-to-face extension activities via road shows etc should be explored, certainly for innovations where there is more uncertainty, higher cost and potentially higher risk for the adopters. The study also identified that small producers had very little contact with or knowledge of APL. These small producers could pose a significant biosecurity threat to the industry and efforts should be made to ensure they receive information. One method may be to facilitate or assist these small producers in the formation of local networks or producer groups. Another constraint to the adoption of new technologies was that some producers lacked confidence in the results. They felt that the trials were done on sub-optimal farms, not typical of the industry which led to overstated results, which they believed would not be achievable on their farm.

Our results suggest that the translation of research into practice is dependent on multiple factors which include receiving information of new technologies, identifying benefits and being able to clearly understand how to apply the new technology. If valuable technologies are to be adopted it is vital that consideration of their on-farm implementation be done in the early stages of the research to ensure they will tick the boxes for producers and veterinarians. The innovation must be shown to confer a relative advantage over existing technologies at a reasonable cost, be easy to understand and implement and have low levels of risk. The inclusion of a field based extension and evaluation plan in all research proposals would likely facilitate the adoption of many new technologies.

References

Guerin, L.J. and Guerin, T.F (1994). Constraints to the adoption of innovations in agricultural research and environmental management: a review. *Australian Journal of Experimental Agriculture* 34, 549-71